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EDITORIAL ANNOUNCEMENT

In beginning a new volume of RHODORA it is important to emphasize that the articles present the views and usages of their authors and that they are not to be taken as always agreeing with the interpretations of the EDITORS. This policy, enunciated at the beginning of publication of the journal, seems the right one to follow in a field where many differences of judgement are found.

OFFICIAL PLANT NAMES?

F. R. FOSBERG

As has happened before several previous botanical congresses, there seems to be at the present time a rather active movement to substitute legislative procedures for research in solving nomenclatural problems. Although botanical congresses have always decisively rejected the idea of a list of conserved specific names, several proposals have been made to create such a list at the 1950 congress. This involves a change in the basis of our system of determining the names of plants serious enough that it should be discussed so thoroughly that all of its implications are brought out. Those who vote on the matter at the congress then may know exactly to what they are opening the way should they adopt this principle.

The task of providing separate and distinctive names for a quarter of a million species of plants would, under the best of conditions, be a difficult one. Even if all the species were well-known and clear-cut, if the task were undertaken with an opportunity to survey the field and plan the whole job, if there were

neither history nor literature to deal with, it is still only too obvious that the job would not be accomplished without a considerable amount of confusion appearing in the result. The most careful of minds grow tired and the best of clerical help make errors.

How much further from ideal were the circumstances under which the members of the plant kingdom actually received their names only the person who has studied the history of systematic botany can fully realize. One need not go back into the nebulous pre-Linnaean period. Beginning with Linnaeus, who made a brilliant start by bringing together the botanical knowledge of his time into a classification that was understandable to all, by providing a simple botanical nomenclature from which homonymy (i. e., the use of the same name for two or more species) and to a certain extent synonymy (i. e., different names for the same species), were eliminated, and by providing a philosophy or set of principles (Critica Botanica: Philosophia Botanica) for the guidance of his successors, even here we find the seeds of confusion. These lie in the simple fact that even the knowledge of plants possessed by the great master was woefully incomplete.

The Linnaean system came into a rapidly expanding world. Early systematists worked during a period when plants were being discovered faster than any person could learn even their names, let alone know how they were distinguished.

These men worked also in a period when communication was infinitely more difficult than at present. They worked with scanty and fragmentary material, with little knowledge of the variability and behavior of plants, with none of the benefits of modern genetics, and with no rules or authority to follow in the naming of their plants except the principles suggested by Linnaeus. Add to this the fact that anyone who cared to could describe and name plants. Those who did included druggists, medical doctors, explorers, zoologists, compilers of dictionaries and other reference works, dealers in specimens, and horticulturists, to mention only a few of the categories other than botanists. Many of these men made valuable observations and contributions to the understanding of plants, but often they wrote in ignorance of what their botanical colleagues had already written. Too often, also, the botanists wrote in ignorance of

what these miscellaneous other workers had already published. The late eighteenth century and the early nineteenth century saw numerous attempts to bring together all plant names in the form of nomenclators or brief treatments of all known plants. These were inevitably out of date before they were published, and they were compiled, not according to any recognized set of nomenclatural principles, but according to their author's personal views on the subject or those of his institution. The last and greatest of these attempts was the Index Kewensis, which started as a nomenclator but in its later supplements acknowledged the impossibility of the task and simply listed published names. The enormous flood of plant names had finally submerged even the most optimistic of those who thought that an end must be in sight.

Meanwhile it was finally realized that in an expanding field of knowledge order could only be achieved by establishing a set of principles and rules for determining that each plant species would have only one name and that a given name would only designate one species. In 1867 an international congress of botanists adopted a code of rules for the naming of plants which, though it has been revised several times, is still in effect. From the first the basic principle in these rules has been that priority of publication is the basis for selection of one from among several names applied to the same plant. More recently has been recognized the obvious principle of determining the application of names by reference to the original (or type) material on which they were based.

These principles, despite occasional difficulty in application, are the only fundamentally objective features in the rules of nomenclature and are the bulwarks standing between an orderly and understandable system and nomenclatural anarchy. In spite of occasional wailing and gnashing of teeth at the consequences of the application of these principles, there has never, since they were made the bases of the rules, been, among botanists, any serious, widespread deliberate disregard of them. The great American Code rebellion was against looseness in the application of these principles rather than against them. It is not an overstatement to say that the functioning of the principle of priority and the type method are the main reason that botanists

can communicate with each other about plants with no serious ambiguity.

Let us examine, then, these recurrent pleas for the conservation of specific names—in other words, for the violation or abandonment of the principle of priority. What is their origin, and have their originators given sufficient thought to their consequences?

Almost invariably such proposals come from foresters, horticulturists, and other practical users of plant names, or from botanists who are in one way or another subject to pressure from these groups. Historically, it is interesting to note that much of the present-day activity in changes of plant names stems from the publications of earlier horticulturists, druggists, and other practical men. Their publications have frequently been in obscure or unlikely places and their descriptions often inaccurate or insufficient for positive identification. And these faults are by no means entirely a thing of the past.

Most of the proposals for conserved specific names specify that the list be kept small, that it be confined to trees and plants of economic importance. Trees are, I suppose, a special case because they are objects of study by foresters. Why the convenience of those interested in economic plants should be of more importance than that of non-taxonomists interested in certain other plants, i. e. morphologists, geneticists, etc. is never stated. I have not seen, so far, a practicable suggestion as to how the list is to be kept small. The hundreds of unimportant generic names proposed for conservation form an example of what may be expected. If those proposing to conserve specific names had really considered the difficulties and ramifications of what they are suggesting, they would probably find it much simpler to learn a few new names now and then rather than to solve all the problems that would arise. Let us consider the case of the name *Sequoia gigantea*, long in use for the big tree of California, surely a fit name to be conserved (see Dayton, W. A., Leafl. W. Bot. 3: 209–219, 1943), if this is a solution to the problems of name changes. There are several reasons why this name must be changed. In the first place, it does not belong to the big tree at all, but is a synonym of the name *Sequoia sempervirens*, having been first applied to the redwood. If it is conserved it obviously should be applied to the big tree, but its type

is the redwood. Of course a new type might be selected, but this would introduce a precedent of violation of the other basic principle of nomenclature that would have far-reaching consequences. The principle of "neotypes" is probably fully as dangerous to ultimate nomenclatural stability as that of violation of the principle of priority. But for argument's sake, suppose a new type were chosen that would attach the name *Sequoia gigantea* to the big tree. Are the difficulties over then? No, for Professor Bucholz has recently proposed that the big tree constitutes a different genus, *Sequoiadendron*. If this is accepted, *Sequoia gigantea* still must be discarded. Should we then insist that the epithet *gigantea* be conserved anyhow? If so it will, with its new typification, need transference to the new genus, but there it will be a later homonym, as the old *gigantea* has already been transferred there. Thus it will have to be conserved all over again, and since the newer binomial, *Sequoiadendron giganteum*, is not especially familiar, there will be much less reason for this. The wailing has all been about *Sequoia gigantea*. Perhaps we should conserve *Sequoia* also. But it has already been conserved for the redwood.

This brings up the question of whether the proposals call for the conservation of epithets or binomials. This is not clear. If it is epithets that are to be conserved, then they will be conserved in all combinations. If binomials only, then a great many of the changes that are objected to cannot be prevented in this way. Also, if a binomial is conserved, does this add its generic name to the list of nomina conservanda?

Another very obvious difficulty arises in the numerous cases where different binomials are in use in different regions for the same plant. The New Zealanders commonly use *Pinus insignis* for the Monterey pine, which is an important economic plant in their country. They might well wish to save this name and might propose it for conservation. The California botanists who have always used the correct name, *Pinus radiata*, would undoubtedly raise a violent protest, as probably would the U. S. foresters. Yet the tree is of economic importance in New Zealand and scarcely so in the U. S. Are the foresters of New Zealand to be sacrificed to the whims of a few impractical Californians just because the plant happens to come from there and

because they happen to have been correct in their use of its name? This seems to be contrary to the reasons for conservation of specific names.

The list of Nomina Generica Conservanda has been in the rules for over forty years and even yet all of its difficulties and inconsistencies are not ironed out. The problems involved in conserving generic names are relatively simple compared with those that would arise where species are concerned. If any of the proponents of conserved specific names think that this would simplify their problems, let them look over the history of the generic name list. They might well decide that it would be simpler to let strict priority operate and learn a new name now and then.

One of the most inevitable evils that would arise under such a scheme would be an attempt to substitute decision by authority for taxonomic research. (See A. C. Martin, Am. Midl. Nat. 34: 800, 1945.) Under even the best-informed authority this would be an intolerable infringement on the freedom of research. Actually, those in high official positions seldom have either the time, inclination, or ability to investigate complex nomenclatural problems well enough to understand them. Official decisions in these matters have an excellent chance of being unfortunate ones.

In repeated conversations with non-taxonomic users of botanical names it has become very evident that the annoyance with name changes is an indiscriminate one, not confined to such changes as are merely the result of discovery of older works or the typification of obscure or incorrectly applied names. There is sometimes a resentment even of cases resulting from increased taxonomic knowledge. This is comparable to resentment that modern theories as to the mechanics of the ascent of sap in trees are not those learned from the textbooks of thirty years ago. These are matters that cannot be settled by legislation any more than the principles of genetics can be regulated by the decisions of political commissars. To open the way to even a possibility of such regulation is too dangerous to be considered,.

The proposals to outlaw names that have not been used for a specified period of time (see Dayton, W. A., Jour. Forestry 41: 373, 1943; Little, E. L., Phytologia 2: 451–456, 1948) would be

less unsatisfactory but due to difficulty in determining when a name had been used, would give rise to much more of the same trouble that they seek to eliminate (see Fernald, M. L., Rhodora 50: 247–249, 1948).

It is appropriate to conclude with some pertinent remarks on the subject by an acute student, E. J. H. Corner, made after a difficult and involved study to determine the correct names for several economic species of *Artocarpus* (Gard. Bull. S. S. 10: 80, 1938):

"I find that it has been proposed by Indian foresters to conserve the name *A. integer*, or *A. integrifolia*, for the Jack of India. Hitherto the conservation of specific names has been discountenanced at Botanical Congresses, and the present instance shows what a dangerous precedent it may create. The confusion between Jack and Champedak can be ascribed only to the incompetence of systematists and their lack of acquaintance with the plants which they have tried to classify. Nor have any practical men, so far as I can ascertain, endeavored to assist systematists in this actual instance. The conservation of specific names can be accepted only if botanists agree to forego entirely their principles of priority and typification, in other words to throw over their system of nomenclature, and to adopt arbitrary names for every species. And supposing such, what is *A. integer* of India, the Chempedak or the Jack, because both species evidently grow there and have been mistaken for each other? Let us rather acknowledge the ignorance that still prevails concerning the systematy of tropical plants and direct our efforts to overcome this."

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WILLOW HYBRIDS: SALIX HEBECARPA FERNALD AND S. SIMULANS FERNALD

CARLETON R. BALL

IN an attempt at monographic treatment of American willows, it becomes necessary to study critically the various new sections, species, and varieties which have been proposed. This is a difficult and laborious task because, while no proof of validity is required when novelties are published, abundant proof of its lack must be furnished when their validity is questioned. In the interest of accurate knowledge, however, such questions must be raised.

The writer already has done this in the case of two monospecific sections (Argyrocarpae and Uva-ursi) proposed by Dr. Fernald.[1] It also has been done for new species (or names) in the case of Small's renaming of *Salix floridana* and Murrill and Palmer's publishing of *S. astatulana;*[2] of Fernald's renaming of long-established (145 years) *S. petiolaris;*[3] and of Schneider's publishing of three new species of Canadian subarctic willows, of which only *S. fullertonensis* could be maintained.[4] During this monographic work, a new "centripetal" method has been developed for the study of abundant material supposedly representing two or more different entities.[5] This method was illustrated by a study of *Salix cordata* Muhl. and *S. missouriensis* Bebb, which showed that the latter could not be maintained as a separate species. Other discussions are in press or in preparation.

Recently, it has been necessary to study two little-known species, *S. hebecarpa* Fernald, and *S. simulans* Fernald, both of which were assigned to Section Roseae by their author. Both are from the St. Lawrence River area of southern Quebec. The results presented below led to the conclusion that both are are hybrids of *S. pedicellaris* Pursh, var. *hypoglauca* Fernald.

[1] Ball, Carleton R. Studying willows or making new sections in the genus Salix. RHODORA **49**: 37–49. 1947.

[2] Ball, Carleton R. Salix floridana Chapman, a valid species. Journ. Arnold Arb. **24**: 103–106, pl. 1. 1943.

[3] Ball, Carleton R. Salix petiolaris J. E. Smith, American, not British. Bull. Torr. Bot. Club **75** (2): 178–187. 1948.

[4] Ball, Carleton R. Schneider's three new Canadian willow species (*S. anamesa*, *S. fullertonensis*, and *S. hudsonensis*). Canad. Field-Nat. **62** (5): 150–152. 1948.

[5] Ball, Carleton R. More plant study: Fewer Plant names. Journ. Arnold Arb. **27**: 371–385. 1946.

This is the only species of Section Roseae in that part of North America and they strongly resemble it in many characters, as Fernald pointed out. The resemblance is so close, in fact, that the other parent cannot be certainly identified. This frequently is the case with hybrids.

In evaluating questions of hybrid origin, some important facts about natural hybrids must be kept in mind. 1, The two parents must have about the same flowering period if wind-blown or insect-carried pollen grains from the male parent are to find receptive stigmas on the ovaries of the female plant. 2, Unless such cross pollination results in the production of fertile seeds, there can be no hybrid progeny. 3, If several or many fertile hybrid seeds are produced by the same pollen on a given plant, the plants which grow from these seeds will not all look alike, because of the laws of inheritance of differing characters. 4, There are many characters, such as size, shape, color, hairiness, toothing, division, glandulation, glaucousness, etc., for each of the many different organs of a single plant (stems, buds, stipules, leafs, peduncles, flower scales, capsules, pedicels, styles, stigmas, stamens, glands, etc.). 5, If all of the hybrid seeds were fertile and most of them produced plants, enormous diversity in the progeny would be evident. 6, In nature, many cross-pollinated ovaries produce no seeds at all, and many seeds which do form are not fertile. 7, Those hybrid plants which most nearly resemble one of the parents are most likely to produce fertile seeds. 8, As their characters are more nearly those of one parent, their progeny from different seeds will show relatively little diversity. That is why the other parent often cannot be identified.

It must be remembered also that a hybrid plant of Salix, after once becoming established, may continue to multiply vegetatively. This may be done by creeping stems, subterranean rootstocks, or even the roots themselves, all of which may produce new shoots. Later, these become independent plants when the connection decays. Spread occurs also by twigs broken off accidentally by wind, water, snow, ice, or animals, and which readily take root in soil or sand, sometimes far away from the parent plant. The new plants from this vegetative reproduction all will be like the plant from which they were

detached. With these facts in mind let us consider the two species named.

Salix hebecarpa Fernald

This plant of Mt. Albert, Gaspe Peninsula, Quebec, was first published[6] in 1907 as *S. fuscescens* var. *hebecarpa* Fernald, n. var. This name was given because the more glabrous and partly creeping form was thought to be *S. fuscescens*, a prostrate willow of Alaska. In 1924, it was raised to specific rank,[7] the more glabrate and the more pubescent forms being considered a single species. Fernald discussed its charachetrs and relationships in both these papers, and again, briefly, in 1930, when publishing his second species, *S. simulans*.[8]

In 1907, Fernald stated that *S. fuscescens* Andersson, an Alaskan creeping species,—

> " . . . is abundant in bogs on the serpentine tableland of Mt. Albert. It is a very attractive creeping shrub, in foliage and other characters strongly suggesting *S. pedicellaris* Pursh . . . [but] . . . quickly distinguished by its usually obovate leaves, the more pubescent scales . . . , the very short thickish pedicels (barely exceeding the scales), the long subulate nectary which is usually half as long as the pedicel, and the definite though short style."

He then states that many colonies on Mt. Albert have the capsules quite glabrous as in the type of the species (*S. fuscescens*) while other colonies, occupying extensive areas, have the capsules distinctly pilose. Fernald and Collins No. 207, the only collection of the pubescent-capsuled form, is designated the type of the new variety *hebecarpa*, differing from the species (*S. fuscescens*) only in "pilose capsules". No reference was made then to the two collections of the creeping plant with glabrous capsules, made in 1905 and 1906. They represent the plant then held to be *fuscescens* itself.

In 1924 (l. c. above), Fernald raised his variety to specific rank as *Salix hebecarpa* (Fernald) n. comb., and included in it the more abundant glabrous-capsuled plant, which he then admitted was not *S. fuscescens* Andersson as he had thought it to be in 1907. Besides the type, pubescent-capsuled No. 207, he cites

[6] Fernald, M. L. (Some new Willows of Eastern America). *Salix fuscescens* Andersson, var. *hebecarpa* Fernald, n. var. Rhodora **9**: 224. 1907.

[7] Fernald, M. L. (New or recently restudied plants of Eastern America). *Salix hebecarpa* (Fernald) n. comb. Rhodora **26**: 123. 1924.

[8] Fernald, M. L. A new willow from the Côte Nord, Quebec. Rhodora **32**: 112–113. 1930. (*S. simulans* Fernald, n. sp.).

three other collections, namely, the unnumbered collection of 1905, No. 206 of 1906, and a recent No. 25,686 of 1923. He states once that all three have "glabrous" capsules and once that they have "glabrous or glabrescent" capsules. He further said that, except for the pubescence of capsules, all four collections formed a "consistent series," and that *S. hebecarpa* stands between *S. fuscescens* and *S. pedicellaris* but that *S. fuscescens* has "quite different leaf-venation", and that the Alaskan shrub has darker scales and smaller capsules."

From *S. pedicellaris* Pursh (meaning var. *hypoglauca* Fernald), he says his new species " . . . is separated by its more obovate leaves, the more pubescent and darker scales . . . , the much shorter, thicker and pubescent pedicels (about equalling to twice as long as the scales), the long nectary and the definite style."

In 1930 (l. c. above), in publishing his *S. simulans*, Fernald discusses *S. hebecarpa* again and states that the name (*hebecarpa*) is a misnomer because "most specimens have the capsules glabrous or only sparsely pubescent." He notes also that the capsules are "6–8 mm. long."

Fernald never described his *S. hebecarpa*, either when publishing it as a variety in 1907 or as a species in 1924, nor in this third discussion in 1930. In all three papers he merely compared it with species in the Section Roseae. It is necessary to consider carefully the characters assigned to *S. hebecarpa* and also to *S. fuscescens* and *S. pedicellaris* (var. *hypoglauca* Fernald) in these three discussions. In raising variety *hebecarpa* to specific rank in 1923 he says that its type (No. 207) and the three collections formerly held to represent *S. fuscescens* form a "consistent series" except for the hairy capsules of the type. The consistency of the expression of the characters assigned must be considered, as well as the accuracy of the comparisons with other species. For these purposes, the writer has given critical study[9] to 1 sheet of the unnumbered collection of 1905, 6 sheets of No. 206, 6 sheets of No. 207 (type), and 6 sheets of No. 25686. Eight comparisons are analyzed.

1. *Prostrate habit.* The first character assigned to var. *hebecarpa* was "creeping shrub", which means both prostrate

[9] The curators of Gray Herbarium, and that of the Arnold Arboretum, have made available much of this material and their courtesy is greatly appreciated.

and rooting. The type, No. 207, shows rooting on the specimens of all six sheets. No. 206 shows rooting on only 4 out of 6 sheets. The unnumbered specimen of 1905 shows rooting on the one sheet seen. No. 25686 shows no rooting on any of the 6 sheets examined, and in other ways does not look like a prostrate plant. In fact, the non-rooting and often elongated apical portions of Nos. 206 and 207 and the unnumbered specimen appear to be ascending or perhaps erect rather than prostrate but this can not be certainly determined without field observations.

2. *Obovate leaves.* In 1907, the varietal type (No. 207) was said to have "leaves mostly obovate", which is correct. But in 1924, the species, then represented by four collections, was said to have "more obovate leaves" than *S. pedicellaris* (i. e., var. *hypoglauca* Fern.). Of these four collections cited, however, only the type (No. 207) has obovate leaves. The unnumbered collection of 1905 has only small elliptic-oblanceolate leaves (1 sheet); No. 206 has oblanceolate to elliptic-oblanceolate leaves with an occasional obovate leaf (6 sheets); and No. 25,686 has similar leaves (6 sheets), the largest broadly oblanceolate. Only the type, therefore, is separated from *S. pedicellaris* var. *hypoglauca* by obovate leaves, if that were a real separation. But var. *hypoglauca* also has obovate leaves. An examination of 86 specimens in the writer's herbarium shows six with leaves definitely obovate and one with leaves partly obovate.

3. *Scale Color and Hairiness.* The next separating character noted by Fernald in 1907 is "more pubescent scales" (in No. 207). In 1924 it is the "more pubescent and darker scales of the ament" in *S. hebecarpa*, which by then includes all four of the collections under discussion. *S. fuscescens* is said to have still darker scales than *S. hebecarpa*. The flower scales of *Salix* are relatively thin and tender organs greatly affected by drying. Those normally yellowish or light brown may become dark brown or blackish, through over-heating in drying. Also, scales appearing blackish by reflected light may show only varying shades of brown by transmitted light. Most of the specimens under discussion were fairly well dried.

The unnumbered specimen of 1905 has the shorter, yellowish, blunter, and almost glabrous scales of normal var. *hypoglauca*, but many of them are discolored somewhat. The other numbers

have longer, partly more acute, somewhat blackish, and more hairy scales, derived from hybridization. Those in the type, No. 207, are broader, blunter, and blacker, indicating that the other parent probably was a member of the creeping Section Ovalifoliae. Both *S. anglorum* and *S. arctophila* are common in the area.

4. *Capsule Hairiness.* In 1907, var. *hebecarpa* was separated wholly on "capsules distinctly pilose", those of the associated plants being "quite glabrous". In 1924, it was stated that "the pubescence of the fruits is by no means constant", which is true. The capsules of the three collections other than the type then are referred to once as "glabrous" and once as "glabrous or glabrescent", which also is true. In 1930, it was said that "most specimens have the capsules glabrous or only sparsely pubescent." Critical study shows that the unnumbered collection of 1905 has ovaries and capsules entirely glabrous; No. 206 has ovaries minutely puberulent to glabrous, and capsules glabrous or rarely thinly pubescent at base; and No. 25,686 has ovaries glabrous or rarely puberulent at base and capsules entirely glabrous. The type, No. 207, has ovaries white-short-pubescent and capsules thinly pubescent throughout. Several species of *Salix* with wholly glabrous capsules may have thinly pubescent ovaries.

5. *Capsule Length.* Size of capsules is not mentioned in the publishing of either variety or species, but, in the 1930 comparison with *S. simulans*, the capsules of *S. hebecarpa* are said to be "6–8 mm. long". Many measurements by the writer on all four of the collections (19 sheets) show a capsule length of 5.5–7.5 mm., but it is quite possible that 8-mm. capsules occur. Important, however, is the statement of 1924 that *S. fuscescens* has "smaller capsules" than *S. hebecarpa*. The recorded range in length of mature capsules of *S. fuscescens* is 6–8 or 9 mm. long, so that they definitely are larger, not smaller, than those of *S. "hebecarpa"*, or those of var. *hypoglauca*.

6. *Pedicel Length and Thickness.* A point stressed in 1907 (for No. 207) was "the very short thickish pedicels (barely exceeding the scales)". In 1924, this reads (for all four collections), "the much shorter, thicker, and pubescent pedicels (about equalling to twice as long as the scales)". In the 1905 collection, the pedicels are glabrous and slender but short

(1–1.5 mm.) compared with var. *hypoglauca*, the whole plant being depauperate. In No. 206 the pedicels are 1–2 mm. long, stout to stoutish and minutely puberulent. In No. 25,686 they are more variable, 1–2 or 2.5 mm. long, stoutish to slenderish, and micro-puberulent to glabrous. On the type, No. 207, they are 1–1.5 mm. long, stoutish, and finely pubescent. Such variation hardly indicates a "consistent series" but does indicate hybrid origin. Occasional capsules on all four collections are almost sessile and on stout pedicels.

7. *Style Length.* In 1907, the style (of No. 207) was referred to as "definite though short". In 1924 (for all four collections), it was called a "definite style", which in *Salix* might mean anything from 0.3 to 3 mm. in length. Glandular structures, such as styles, stigmas, and nectaries, are more likely to be variable in length than are the firmer organs. Development is easily affected by frost and they also may shrink after maturing, even if normally developed. On the 1905 depauperate collection, the styles are 0.2–0.3 mm. long, or normal for var. *hypoglauca*. On the other three collections, they mostly are 0.4–0.8 mm. and entire, or rarely to 1 mm. long on the type.

8. *Gland Length.* In 1907, Fernald recorded "a long subulate nectary which is usually half as long as the pedicel" and in 1924 he referred to the "long nectary". The gland on the 1905 depauperate collection is 0.4–0.5 mm. long, as in var. *hypoglauca*. On the three numbered collections, the subulate or filiform gland is from 0.4–0.8 or rarely 1 mm. long, and finely capitate.

From the preceding discussion, it will be seen that the four collections studied are all variable but that they fall into two groups.

The first group has most of the characters of *S. pedicellaris* var. *hypoglauca* but shows depauperate growth. It contains only the unnumbered 1905 collection of Collins and Fernald, alpine bogs, alt. 1000 m., Mt. Albert, Gaspe Co., Quebec, Aug. 8–15, 1905, distributed as *S. myrtilloides* L. A single Gray Herbarium specimen has been studied. This is a plant 6 dm. long, 4 mm. in diameter at the base, unbranched and rooting for 38 cm., then branching and heavily fruited. Except for the rooting habit and leaves not normally reticulate, especially above, this would pass for depauperate var. *hypoglauca*. Root-

ing could be produced by heavy snow coverage and elevation, but the plant well may be a hybrid.

The second group includes the other three collections: Fernald and Collins 206 (as *S. fuscescens* Andersson) and 207 (type, as *S. fuscescens* var. *hebecarpa* Fernald, n. var.), both from alpine bogs on the serpentine tableland, alt. 1100 meters, Mt. Albert, Gaspe Co., Quebec, July 21, 1906; Fernald, Griscom, Mackenzie, & Smith 25,686, from sphagnum bog, bordering a pond at about 1050 m. altitude in the hornblende area south of Flagstaff Peak, Mt. Albert, July 24, 1923. Six sheets of each of these have been studied. The first two numbers show rooting habit in part but the third shows none. Shape of leaves varies also, as noted in discussion. All three agree in showing some puberulenec or pubescence on pedicels and capsules but both quantity and area covered vary greatly, even on the same plant. They agree also in styles 2 to 3 times as long as in var. *hypoglauca,* and also in longer stigmas and glands, and mostly stouter pedicels, but all of these characters vary greatly and on the same plant. Their strong resemblance to var. *hypoglauca,* accompanied by great variation among the three, as well as within each collection, almost certainly indicate hybrid origin. The further fact that relatively few seeds were produced in the abundant capsules, and that most of those seen seem to be infertile, is another strong indication of hybridity. As noted above, the creeping habit of two and the larger, darker, and hairier scales of all three, suggest that either *S. anglorum* or *S. arctophila* was the male parent. The capsule hairiness and longer styles also could have come from either of these parents. On Nos. 206 and 207, the most creeping collections, some of the tiny undeveloped basal leaves still are more or less densely long hairy beneath, especially toward the apex. This is characteristic of similar leaves in the creeping Section Ovalifoliae, to which the suggested male parents belong.

Some other specimens have been assigned to *S. hebecarpa.* Two of these have just been reviewed critically, with the following results.

Dutilly and Lepage 14,503, from Riviere aux Melezes (Larch River), rivage, un peu en haut de la Riviere Russell, in Labrador Peninsula, northern Quebec, Aug. 8, 1945, was determined as

S. hebecarpa by Ball. It proves to be primarily *S. arctophila* Ckll., and probably a hybrid, perhaps with *S. pedicellaris hypoglauca* by its narrower scales and long glabrate capsules.

Mackenzie and Griscom 11,048, from Green Gardens, headland of Cape St. George, western Newfoundland, July 20, 1922, was distributed as *S. cordifolia* var. *Macounii* (Rydb.) Schneider. Later it was annotated as *S. hebecarpa* Fernald by some one. It is undoubted *S. anglorum* Chamisso, the smaller than average leaves with broad bases tending toward its variety *kophophylla* Schneider.

Salix simulans Fernald

In 1930, Fernald published[8] his *Salix simulans*, from "Open marshy area, Betchuwun, Saguenay Co., Quebec, Harrison F. Lewis (type in Gray Herbarium, Aug. 26, 1928." He states that the plant was so puzzling that he encouraged Dr. Lewis to obtain a second collection in 1929. Lewis evidently did so, but it is not cited or further mentioned in the paper. However, two sheets of it have been received from Gray Herbarium for critical study. The labels bear the habitat data given above for the 1928 type collection, except that the 1929 date is Sept. 3 (pencilled field labels) or Sept. 13 (handwritten sheet labels).

Fernald says that: "In its very tomentose and short-pedicelled capsules it would seem to belong in the § *Glaucae*,. . . . . In foliage, however, *S. simulans* is as clearly a member of the § *Roseae*." The pubescent buds and young twigs, and the thinly pubescent young leaves (beneath), also suggest Sect. Glaucae, as do the long and hairy scales. The blades, however, are not as exactly similar to those of *S. pedicellaris*, var. *hypoglauca* as Fernald would seem to indicate. Shape, color, and general appearance are much the same but the blades, even though collected in autumn, are plane to incised-reticulate above rather than raised-reticulate. The fine reticulation beneath also is not as strongly raised as is normal for var. *hypoglauca*. The primaries are distinctly raised, the secondaries moderately so, but the tertiaries often are scarcely elevated at all. Some of those not raised are fairly clearly seen, however, because they have darkened slightly in drying and so are visible through the glaucous epidermis.

Certain striking aspects of this puzzling plant strongly indicate that it is a hybrid and not a species. The plant obviously is sexually deficient, a common result of hybridity. There are five portions of the plant, from 8–12 inches long and freely branching, on these two sheets of the 1929 collection. Two portions bear 2 aments each, two bear 1 each, and the fifth bears none. Similar growth of any of the suspected parents normally would carry from three to five times as many aments. The aments also are smaller than those of species in either section named and obviously are of depauperate development.

Most important is the fact that the ovaries never had developed into capsules, although collected in September. What Fernald described as densely white-tomentose obtuse capsules 2.5–4 mm. long actually are ovaries which never developed beyond that stage. This probably was partly because of the lack of stimulation derived from fertilization and partly because of the general lack of sex vigor discussed above.

Ovaries in Salix are normally white-tomentose and blunt, even though the mature capsules become relatively thinly gray-pubescent and acute as they develop. That these are still only ovaries is proved by the fact that they are completely sterile, there being no sign of seeds and very little of the normally abundant parachute hairs which surround the seeds and usually elongate even if the seeds do not develop beyond the germ stage. Further proof that these are ovaries is seen in the fact that the two valves have not separated and recurved as most capsules would have done before that time in the autumn. Some valves have not separated at all and most of them have merely opened and the tips separated more or less widely. Only a few have reached a right angle and none have recurved in the normal manner.

Finally, there is that considerable variation in some of the organs which is a common result of hybridization. This diversity, however, is not as great as in many hybrids and might have been more apparent if there had been greater sex vigor and continued development of the organs. The longest styles and stigmas are 2 to 3 times as long as the shortest and there is considerable dividing of the styles. Diversity in the length of styles and stigmas and in the division of styles is relatively more common in Section Glaucae than in many other Sections of *Salix*.

Fernald described the flower scales as broadly oblong, 2–2.5 mm. long, apex rounded to emarginate. They vary considerably and some appear to be almost obovate and dark brown in color. Many of the leaf blades are sparsely glandular-denticulate (not "dentatis" as stated by Fernald), especially on the basal portion. Such denticulation and also obovate blackish scales are characteristic of *S. arctophila*, of the prostrate Section Ovalifoliae. Sparse denticulation occurs rarely in most species of Section Glaucae, and one (*S. McCalliana*) is normally rather closely crenulate-denticulate throughout. Whatever the male parent, it is practically certain that *S. simulans* is a hybrid.

Washington 15, D. C.

Three Additions to the Flora of Nova Scotia.—In late August and early September of 1932, accompanied by my daughter and son, I took a brief vacation, driving by conventional routes through southern New Brunswick and western Nova Scotia. Although this was not primarily a collecting-trip, it was inevitable that we should occasionally collect a few species which seemed of local interest. Upon returning to Cambridge, I began the intensive but perpetually interrupted work on a revision of Gray's *Manual*, and the little collection of plants was pigeonholed, to be retrieved only now, as the proof of the Manual is being read. Three plants collected seem not to have been reported from Nova Scotia and they are here noted.

Eleocharis ovata (Roth) R. & S., var. Heuseri Uechtrict. Cumberland Co.: sandy shore of Trueman's Pond, Treumanville, no. 1618.

Polygonum achoreum Blake in Rhodora, xix. 232 (1917). Annapolis Co.: border of salt-marsh, Annapolis Royal, no. 2625.

When he published *Polygonum achoreum*, often a weedy species (the name meaning "without a native land"), Blake said: "the present species, although pretty certainly indigenous in the United States, has apparently never been found in a clearly native condition". On the saline marshes of Annapolis River it is an element in the regular halophytic native flora of *Suaeda, Salicornia*, etc.

ASTER TARDIFLORUS L. COLCHESTER COUNTY: by spring in woods near Summit Park on Route 11, about 12 miles north of Truro, no. 2608.

A very typical colony.—M. L. FERNALD.

SOME ADDITIONS TO THE OKLAHOMA FLORA

U. T. WATERFALL

DURING the summer of 1948 the author continued his research on the flora and vegetation of Oklahoma as Botanist with the Oklahoma Biological Survey, following a general plan previously outlined.[1] Collections were made from areas situated in all parts of the state. Particular attention was given to those showing evidence of unique floral relationships as compared with the flora of the principal parts of the state.

One such area is to be found in southwestern Oklahoma, especially in Harmon and Jackson Counties. Much of the land is in cultivation, wheat being the principal crop at the present time. Other parts are too rough or have a soil too shallow and poorly developed for agriculture. Much of the latter land is used for pasture, and is frequently characterized by *Buchloe dactyloides* with a sparse to a rather dense stand of *Prosopis juliflora* var. *glandulosa*. Other characteristic grasses on such sites are *Boutelous rigidiseta*, *B. gracilis*, *Aristida purpurea*, *Muhlenbergia Torreyi*, *Triodia pilosa* and *Schedonnardus paniculatus*. *Hordeum pusillum* is frequently abundant in the spring.

On saline sites the principal grasses found are *Sporobolus airoides* and *Distichlis stricta*. Occasionally *Sporobolus texana* is abundant.

On sandy soils *Andropogon scoparius* becomes the dominant species when not overgrazed. *Andropogon Hallii* is often abundant, and *Artemisia filifolia* is more or less common, its abundance depending primarily on the grazing pressure.

In the southwestern part of Harmon County *Condalia obtusifolia* becomes a characteristic shrub found scattered on grassland, and fairly abundant on ridges and "breaks" along the Red River and its tributaries. Here also are found *Rhus microphylla*,

[1] Waterfall, U. T., *Some Results of a Summer's Botanizing in Oklahoma*. RHODORA 51: 18–21, 1949.

Opuntia leptocaulis, Cassia Roemeriana, Setaria macrostachya, Nicotiana trigonophylla and *Cevallia sinuata.*

A list of some of the species of southwestern affinities collected in this general area includes *Juniperus Pinchoti, Bouteloua barbata, B. rigidiseta, Hilaria mutica, Setaria macrostachya, Sueada suffrutescens, Abronia fragrans, Clematis Drummondii, Cassia Roemeriana, Erodium texanum, Euphorbia albomarginata, E. lata, Reverchonia arenaria, Rhus microphylla, Condalia obtusifolia, Sida physocalyx, Cevallia sinuata, Echinocactus texensis, Opuntia leptocaulis, Limonium limbatum, Sarcostemma crispa, S. cynanchoides, Cressa truxillensis, Verbena plicata, Lycium Barlandieri, Nicotiana trigonophylla, Plantago Wrightiana, Houstonia humifusa, Ibervillea Lindheimeri, Aphanostephus ramosissimus, Gaillardia pinnatifida, Haploesthes Greggii* var. *texana* and *Helenium microcephalum.*

There follows an enumeration of plants new to Oklahoma or otherwise noteworthy. Those that the author believes to be hitherto unreported from the state are prefixed with an asterisk. There are thirty-five such entities recorded.

ENUMERATION OF SPECIES

*AEGILOPS CYLINDRICA Host., var. RUBIGINOSA Popova. The pubescent variety was collected as *Waterfall* 7786, overgrazed pasture, 3 miles south of Gould, Harmon County, June 5, 1948. In our herbarium we also have referrable to this variety *Charles Smith* 2073, Beckham County, June 11, 1940.

*AGROSTIS VERTICILLATA Vill. was collected as *Waterfall* 7919, sand, bed of the Cimarron River, 4 miles north and 1 mile west of Kenton, Cimarron County, June 14, 1948. It was quite abundant there.

Hitchcock[1] says it is found from "Texas to California, north to southern Utah and Washington". His distribution map shows that it has been collected in New Mexico. Featherly[2] does not list it from Oklahoma.

*BOUTELONA BARBATA Lag. was collected as *Waterfall* 8729, shallow silty clay on gypsum, 6 miles south of Hollis, Harmon County, August 26, 1948.

[1] Hitchcock, A. S., *Manual of the Grasses of the United States.* 329–330. 1935.
[2] Featherly, H. I., *Manual of the Grasses of Oklahoma.* 1946.

Featherly (op. cit.) does not list this species from Oklahoma. Hitchcock[1] includes the adjoining states of Texas and New Mexico in its range.

ERIANTHUS ALOPECUROIDES (L.) DC. Featherly (op. cit.) cites this species from Oklahoma. As the basis for its inclusion, he says: "Specimen (727529) in the U. S. National Herbarium . . . Indian Territory. The collector's name is not on the label, nor is the date. The place on the form label for date is made 188–, which shows that it was probably collected sometimes in the eighties."

Referred to this species is *Waterfall* 8532, rocky slopes of Kiamichi Mountains, 1 mile north and ½ mile west of Honobia, Pushmataha County, August 9, 1948. Thus, after 60 years, is made a confirmatory collection of the above somewhat dubious record.

*GLYCERIA ARKANSANA Fernald. A species of *Glyceria* apparently referrable to *G. arkansana* was collected as *Waterfall* 8070, in swamp at edge of pond, 8 miles west of Tom, McCurtain County, June 23, 1948.

Fernald[2] in describing the species cites material from Arkansas and Louisiana. Hitchcock[3] adds "Texas (fide Fernald)". This is another element of the flora which is southeastern in its affinities.

*MUHLENBERGIA PORTERI Scribn. was collected as *Waterfall* 8669, blue and red shale along West Carrizo Creek, 3 miles north and ½ mile west of Kenton, Cimarron County, August 23, 1948, and as *Waterfall* 8693, sandstone buttes (with *Pinus cembroides* var. *edulis*, *Pinus ponderosa*, *Juniperus monosperma* and *Quercus* spp. south of Tesequite Creek, 1 mile west and 4 south of Kenton, Cimarron County, August 24, 1948.

The species is not listed by Featherly (op. cit.). Hitchcock[4] says it occurs from "western Texas to Colorado, Nevada and southern California, south to northern Mexico".

*ORYZOPSIS HYMENOIDES (Roem. & Schult.) Ricker. This species was collected as *Waterfall* 7910, sand around white sandstone, north of the Black Mesa, 3 miles north and ½ west of Kenton, Cimarron County, June 13, 1948.

[1] Hitchcock, A. S., *op. cit.* 517.
[2] Fernald, M. L. *Four Grasses of Eastern America.* RHODORA 31: 49. 1929.
[3] Hitchcock, A. S., *op. cit.*
[4] Hitchcock, A. S., *op. cit.* 381. 1935.

Hitchcock (*op. cit.*) shows the species occurring in the adjacent states of Kansas, Colorado, New Mexico, and Texas, but not in Oklahoma.

SPOROBOLUS POIRETII (Roem. and Schult.) Hitchc. This species was collected as *Waterfall* 8045, sand, edge of oak-pine woods, 1 mile west of Tom, McCurtain County, June 23, 1948.

Hitchcock (op. cit.) gives Arkansas and Texas as constituting its western limit of range. Featherly (*op. cit.*) states that it has been collected in Pittsburg County. Possibly it will be found in the intervening area.

*CYPERUS COMPRESSUES L. Referred to this species is *Waterfall* 8477, collected in flower beds, Cavender Tourist Courts, Idabel, McCurtain County, August 8, 1948.

Small[1] states that this species occurs "in fields, Maryland to Florida, Missouri and Texas." Cory[2] lists it only from the Coastal Prairies.

*CYPERUS FLAVESCENS L., var. POAEFORMIS (Pursh.) Fern. So referred is *Waterfall* 8059, ditch east of Tom, McCurtain County, June 23, 1948.

Neither Jeffs and Little[3] nor Stevens[4] list the species from the state. Fernald[5] says that var. *poaeformis* extends from the West Indies and Florida to Texas, northward to southeastern New York, Pennsylvania, Ohio, Michigan, Illinois and Missouri.

*RHYNCHOSPORA CORNICULATA (Lam.) Gray, var. **typica** nom. nov. (*Schoenus corniculatus* Lam. Tabl. Encycl. **1**: 137. 1791). Referred to var. *typica* is a collection having achenes about twice as wide as the bases of the tubercles. According to Fernald[6] this is a distinguishing characteristic of typical *R. corniculata*. The collection is *Waterfall* 8528, slew 3 miles east of Albion, Pushmataha County, August 9, 1948. Also referred to var. *typica* is *Waterfall* 8106, 2 miles southeast of Talihina, LeFlore County, June 24, 1948.

[1] Small, J. K., *Flora of the Southeastern United States*. 1913.

[2] Cory, V. L., *Catalogue of the Flora of Texas*. 26. 1938.

[3] Jeffs, R. E. and Elbert L. Little. *A Preliminary Checklist of the Ferns and Seed Plants of Oklahoma*. 1930.

[4] Stevens, G. L. *The Flora of Oklahoma*. Unpublished MSS. Original deposited in the Widener Library of Harvard University. 1916.

[5] Fernald, M. L. *Last Survivors in the Flora of Tidewater Virginia*. RHODORA **41**: 529–530. 1939.

[6] Fernald, M. L., *Some Allies of Rhynchospora macrostachya*. RHODORA **20**: 138–140. 1918.

*Rhynchospora corniculata (Lam.) Gray, var. interior Fern. So referred are plants collected as *Waterfall* 8449. The perianth bristles are shorter than the achenes, which have their distal ends little wider than the bases of the tubercles as described by Fernald (op. cit.). The collection was taken from a swamp at the edge of Big Grassy Lake, 4 miles west and 4 south of Tom, McCurtain County, August 7, 1948. In our herbarium we also have *Milton Hopkins and Van Valkenburgh* 6127, deep rich swampy woods of maple, gum, and water oak near cypress swamps, 5 miles east and 4 south of Broken Bow, McCurtain County, October 12, 1941.

*Rhynchospora glomerata (L.) Vahl., var. angusta Gale. We have one collection of *R. glomerata* which is referred to var. *angusta* because it has a more slender and accentuated gynophore than our other representatives of this species. It is *Waterfall* 8549, ditch 8 miles west and 1½ south of Talihina, Latimer County, August 9, 1948.

Gale[1] cites material from Arkansas, Louisiana, and Texas.

*Rhynchospora globularis (Chapm.) Small, var. recognita Gale (*R. cymosa* of authors).

Gale[2] gives a range-statement that includes "scattered in eastern Texas (and) Louisiana." Jeffs and Little[3] list this species (as *R. cymosa*) but the only material so named in our herbarium, *Little*, sin num., Muskogee County, July 4, 1929, is not that species, but is *R. Harveyi*. This sheet is probably the basis for the previous report of *R. cymosa*.

Scirpus californicus (C. A. Meyer) Steudel was collected as *Waterfall* 8029 and 8446, both from the swamp at the edge of Big. Grassy Lake, 4 miles west and 4 south of Tom, McCurtain County.

The only other reference I find to this species from Oklahoma is in Beetle's Monograph[4] where he cites *J. deGruchy* 130 collected near Tahlequah.

*Scleria oligantha Michx. was collected as *Waterfall* 8061, in woods 3½ miles south and 2 miles east of Tom, McCurtain County, June 23, 1948.

[1] Gale, Shirley. *Rhynchospora Section Eurhynchospora in Canada, the United States and the West Indies.* Rhodora **46**: 245–246. 1944.

[2] Gale, Shirley. *Rhynchospora, Section Eurhynchospora in Canada, the United States and the West Indies.* Rhodora **46**: 245–246. 1944.

[3] Jeffs, R. E. and Elbert L. Little, *A preliminary List of the Ferns and Seed Plants of Oklahoma.* Publ., U. of Okla. Biol. Survey. **2** (2): 1930.

[4] Beetle, Alan A., *Studies in the Genus Scirpus L. III.* Am. Jour. Bot. **28**: 698–699. 1941.

Core[1] cites collections from the adjacent states of Arkansas and Texas. The author's 8061 represents an eastern extension into Oklahoma.

SCLERIA TRIGLOMERATA Michx. sensu Fern.[2, 3] non sensu Core. In our herbarium we have the following sheets of this species: *E. Little* 2572, Muskogee County, August 28, 1927; *O. M. Clark* sin num, Laura, Latimer County, June 16, 1930.

*JUNCUS BUFONIUS L. was collected as *Waterfall* 8052, in ditch east of Tom, McCurtain County, June 23, 1948.

This small annual *Juncus* is not listed by Jeffs and Little (*op. cit.*). Stevens (op. cit.) includes the species, but only says it "should be expected." The above cited collection realizes his expectation.

*QUERCUS GAMBELII Nutt. Referred to this species are: *Waterfall* 8700 and 8701, canyon between hills, 5 miles south and 1 west of Kenton, Cimarron Counties, August 24, 1948, and *Waterfall* 7951, same locality, June 14, 1948.

*SILENE STELLATA (L.) Ait. f. var. SCABRELLA (Nieuwl.) Palm. and Steyerm. In our herbarium we have 2 sheets of the typical, glabrous variety. The other 15 sheets are of var. *scabrella*.

CLEMATIS DRUMMONDII T. & G. was taken as *Waterfall* 8715 (pistillate) and 8732 (staminate), 4 miles south of Hollis, Harmon County, August 26, 1948.

Stevens (*op. cit.*) has previously reported it from the "southwestern part of the State." The species is little collected in Oklahoma. We have no other material in our herbarium, and it is not listed by Jeffs and Little or by Stemen and Myers.

(*To be continued*)

[1] Core, Earl L. *The American Species of Scleria.* Brittonia 2: 75–76. 1936.

[2] Fernald, M. L., *Plants from the Outer Costal Plain of Virginia.* RHODORA 38: 398. 1936.

[3] Fernald, M. L., *Another Century of Additions to the Flora of Virginia.* RHODORA 43: 539–541. 1941.

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